PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

10/516999

Applicant's or agent's file reference 1406 WO	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/BE 03/00097	International filing date *(day/month/year)* 03.06.2003	Priority date *(day/month/year)* 07.06.2002
International Patent Classification (IPC) or both national classification and IPC B22D1/00		
Applicant VESUVIUS CRUCIBLE COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
15.12.2003	23.08.2004
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Ceulemans, J Telephone No. +31 70 340-3157

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/BE 03/00097

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-5	as originally filed

Claims, Numbers

1-9	as originally filed
10	received on 19.07.2004 with letter of 14.07.2004

Drawings, Sheets

1/1	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   - ☐ the description, pages:
   - ☐ the claims, Nos.:
   - ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-10
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-10
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: EP-A-1 101 825 (VEITSCH RADEX GMBH) 23 May 2001 (2001-05-23)

D2: PATENT ABSTRACTS OF JAPAN vol. 2002, no. 09, 4 September 2002 (2002-09-04) & JP 2002 129224 A (SHINAGAWA REFRACT CO LTD), 9 May 2002 (2002-05-09)

The subject matter of independent claim 1 can be considered to be both novel and inventive over the prior art. None of the cited documents reveals a porous plug having the combination of randomly directed pores and slots or bores, where both systems are independent of each other.

D1 which represents the closest prior art, discloses the combination of pores and slots. However, the subject matter of D1 differs in the sense that these two blowing/purging systems are not independent of each other.

D2 on the other hand does show two independent systems but not for the same purpose ; moreover, the porous inner plug extends only to a limited height and is not in contact with the molten metal under normal working conditions.

Therefore the subject matter of claim 1 is both novel and inventive. The subject matter of the dependent claims 2-9 is hereby rendered novel and inventive as well.

As a matter of course the use of such a porous plug (claim 10) is novel and inventive as well in accordance with Art. 33(2) and (3) PCT.

Claims.

1. Injection device (1) for the introduction of a fluid into a metallurgical vessel having a refractory lining, the device
   - being removably insertable in the lining;
   - comprising a refractory first body (2) and a refractory second body (3) fittingly assembled, the first body (2) being made of a refractory material less permeable to the fluid than the material of the second body (3),
   the first and second bodies
   - having each a surface (4, 5) adapted to contact molten metal; and
   - having each fluid passages (6, 7) extending from fluid feeding means (8) to a surface (4, 5) adapted to contact molten metal,
   the relative flow resistance of the fluid passages (7) in the second body (3) being higher than that of the fluid passages (6) in the first body (2), the fluid passages (6) in the first body (2) being constituted of slots or bores, **characterized in that** the fluid passages (6) in the first body (2) are independent from the fluid passages (7) in the second body (3).

2. Injection device according to claim 1, **characterised in that** the second body (3) is fittingly inserted in the first body (2).

3. Injection device according to claim 2, **characterised in that** the second body (3) is inserted in the middle of the first body (2).

4. Injection device according to claim 3, **characterised in that** the fluid passages (6) in the first body are substantially parallel to the interface between the first and second bodies (2,3).

5. Injection device according to claim 3, **characterised in that** the fluid passages (6) in the first body are aligned radially from the centre point of the second body (3).

6. Injection device according to claim 1, **characterised in that** the second body is made of a refractory material permeable to the said fluid.

7. Injection device according to claims 6, **characterised in that** the second body is made of a pressed refractory material.

8. Injection device according to claim 1, **characterised in that** the slots or bores are of controlled direction and opening sizes.

9. Injection device according to claim 1, **characterised in that** the first body is made from a castable material.

10. Use of a device according to any one of claims 1 to 9 for the injection of a fluid into a metallurgical vessel.